

NUCLEAR ENERGY

The energy associated with the nucleus of the atom.

The fundamental unit of matter is the atom. The atom is made up of protons, neutrons and electrons. The forces that hold the central part (nucleus) of the atom together are immense. Two processes are possible that can release this energy. One is called *fusion* and involves combining the centers of two or more atoms. The other is called *fission* and involves breaking the nucleus apart. In either case very large quantities of energy can be released.

Current nuclear power plants conduct *fission* reactions. A large portion of the energy produced from these nuclear reactions is released in the form of thermal energy. This thermal energy is then used to heat water to steam and turn turbine systems and produce electricity. Such *fission* reactions also produce a form of energy called *radiation* along with radioactive waste products. *Radiation* is a very powerful form of radiant energy and can cause cell damage and impair cell function of living organisms. Care must be taken in designing and operating a nuclear power source to appropriately contain the radioactive byproducts of nuclear power.

Further considerations: The sun is basically one big, on-going nuclear reaction. The process is so intense that you can step out side on a sunny day and feel the heat of this reaction. The type of nuclear process occurring in the sun is *fusion*. Scientific teams are working to uncover a way to use fusion for our own power needs. *fusion* involves combining atoms rather than splitting them apart (*fission*) and can avoid the radioactive by products and disposal problems associated with *fission* reactions. Currently the amount of energy required to create *fusion* in the laboratory is far greater than can be gained from the *fusion* event. If scientists can determine a practical way to induce *fusion*, this may be a very attractive energy source indeed.